Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Parts 2 and 15 of the Commission's Rules Regarding Spread Spectrum Transmitters	)	ET Docket No. 96-8 RM-8435, 8608, 8609

To: The Commission

COMMENTS OF METRICOM, INC.

Metricom, Inc. ("Metricom"), by its attorneys, hereby submits these Comments in response to the Commission's Notice of Proposed Rule Making (the "*Notice*") concerning the operation of spread spectrum transmitters. Metricom is a member of the Part 15 Coalition which is also filing Comments in this proceeding. Metricom is filing these Comments to supplement the Part 15 Coalition's Comments, which generally support the *Notice*, and to provide Metricom's views on certain specific issues.

I. METRICOM'S INTEREST

1. Metricom is a young, rapidly growing, technologically innovative company based in Silicon Valley. In accordance with the encouragement of the Commission in various Part 15 proceedings, Metricom is a pioneer in the development of state-of-the-art spread spectrum, packet radio systems. Metricom has invested significant sums of money, time and energy to develop, manufacture and market sophisticated RF devices which operate on an unlicensed basis

pursuant to Part 15 of the Commission's Rules. Operating at a gross over-the-air transmission rate of 100 kbps and actual user data rates of up to 28.8 kbps, Metricom's Ricochet® service is the fastest, most easily deployable, and least expensive wide area (regional) wireless data network available today.

2. Metricom was able to develop this system primarily because it was allowed to operate a spread spectrum system in an unlicensed environment. This provided maximum flexibility with minimal rules and the opportunity to encourage its engineers to be creative. Metricom has consistently taken the position that the Commission should adopt only very minimal and flexible technical standards. Such an approach which will promote and assure the most efficient and effective use of the spectrum for unlicensed operations, as well as encourage the utilization of adaptive and intelligent RF transceivers. This is especially important because no one can predict the technology or applications which will be developed for the band. Complicated and restrictive technical specifications can only stifle innovation and development.

II. THE COMMISSION'S PERCEPTION OF INTERFERENCE IS NOT ACCURATE

3. While the Commission has proposed allowing increased directional antenna gain for 5800 MHz spread spectrum systems, it proposes not to allow increased antenna gain at 2400 MHz. Even where increased directional antenna gain is proposed, the Commission proposes limiting directional antenna gain above 6 dBi by reducing the output power of the transmitter 1 dB for every 3 dB

that the antenna gain exceeds 6 dBi Metricom submits that these proposed antenna gain restrictions are based on improper assumptions regarding interference.

4. With respect to the potential for interference to other systems at 2400 and 5800 MHz, there are currently many spread spectrum systems operating, through waivers, that are using unlimited antenna gain at both 2400 and 5800 MHz. To the best of Metricom's knowledge, there have been no known cases of interference caused by these systems to licensed or unlicensed operations. This real world experience is evidence of the fact that there is not a real problem with interference from these systems.

5. With respect to the potential for interference to other Part 15 operations, because of the design of Part 15 spread spectrum systems, there is really no problem. In the spread spectrum systems, interference at the radio physical layer is mitigated and "worked through" by technologies applied at the link and routing layers of current Part 15 systems. Coding gain and digital signal processing are additional technologies applied to mitigate interference. This implies that the Commission's current definition of interference does not consider the fact that these newer technologies deal very well with interference: both intrasystem and intersystem interference is expected and is considered a normal part of operation. In fact, the introduction of spread spectrum is one of those newer technologies that helps reduce interference to and from other systems.

6. It must be emphasized that the greatest threat of interference in the spread spectrum bands is not from Part 15 transmitters. Part 18 ISM transmissions present the greatest threat of interference in the band. Although microwave ovens are currently the largest factor in broadband interference generation at 2400 MHz, there are new ISM technologies beginning to appear -- such as microwave excited lighting systems -- that pose the greatest interference threat. These Part 18 devices pose the greatest threat because they are very broad band in nature and have *no radiated power limits* within the defined bands. Therefore, the performance of both licensed and unlicensed systems in the band could be significantly impaired by ISM equipment operations. One way this harmful interference could be mitigated by Part 15 operations would be to achieve higher system reliability through the use of directional antenna gain.

7. In addition, the Commission should not overlook the fact that, under the rules, Part 15 operations must not cause interference to, and they must accept interference from, other authorized users in the band. Accordingly, if a spread spectrum system operating with unlimited directional antenna gain is causing interference, it must eliminate the interference. This requirement, coupled with the facts that (i) present operations have illustrated that there is no interference to authorized users, and, (ii) Part 15 operators can and must tolerate interference from other Part 15 operations, clearly demonstrate that interference is not a critical concern. Therefore, the Commission should allow

unlimited directional antenna gain in the 2400 and 5800 MHz frequency bands.

8. One final point with respect to high gain directional antennas should be clarified. At paragraph 13 of the *Notice*, the Commission states that "the marketing of spread spectrum systems employing high gain antennas should be limited to commercial or industrial operators and exclude sales to the general public." At paragraph 9 of the *Notice*, the Commission states that "we are proposing to eliminate the antenna directional gain limit only for non-consumer, fixed point-to-point spread systems . . . ."

9. Metricom understands the reasons for, and agrees with the Commission's position of not making these high gain directional antennas available to the general public. However, Metricom believes that the Commission does not intend to exclude entities other than those enumerated, such as educational institutions or government entities, for example, from employing such facilities, nor does the Commission intend to exclude consumer traffic from being carried over facilities employing high gain directional antennas. Therefore, the Commission should clarify the limitation to indicate that systems employing high gain directional antennas are not available for sale to, or installation by, the general public. This limitation would not, therefore, limit the entities able to use the facilities, or the type of traffic to be carried by the facilities.

III. THEE COMMISSION SHOULD NOT PERMIT FREQUENCY HOPPING SPREAD SPECTRUM SYSTEMS IN THE 915 MHZ BAND TO USE FEWER THAN 25 HOPPING CHANNELS

10. While Metricom can reluctantly agree with the Commission's proposal to allow a minimum of 25 hopping channels for frequency hopping spread spectrum systems in the 915 MHz band, it is opposed to providing any fewer than 25 hopping channels. The essence of spread spectrum systems is, as its name implies, the spreading of RF energy throughout the band. Using the entire band to spread the signal in a frequency hopping system makes the best use of both frequency-division and time-division diversity aspects for high performance and minimal interference generation and reception. Spreading the signal throughout the entire band, therefore, promotes a higher degree of sharing because all users have access to the entire band.

11. Requiring fewer hopping channels has the effect of segmenting a portion of the band in which a hopping system operates. Therefore, the frequency-division aspect of using the band is diminished. For a given level of system performance, the frequency hopping system within the segment will spend more time in that particular segment than it would have if the entire band were being used. In effect, a tradeoff is made between the frequency domain and the time domain to maintain system performance.

12. When the signal is not spread throughout the entire band, at a given level of system performance, more time will be spent in less spectrum space resulting in increased probability for

interference generation and reception. Spreading the signal throughout the band allows spread spectrum systems to provide very high levels of system performance because they make use of very wide bandwidths and are able to share those wide bandwidths with many users *provided* both the frequency division and time division aspects are exploited.

IV SHORT DURATION TRANSMISSION SYSTEMS MUST COMPLY WITH SECTION 15.247

13. The Commission has requested comment on systems employing short transmission bursts, and their authority to operate as spread spectrum systems. Metricom fully agrees with the Commission that all products authorized as frequency hopping systems must be capable of conducting themselves as frequency hopping systems. As long as these systems can comply with the requirements of Section 15.247, there is no reason to preclude them from authorized operations. Allowing these systems to operate in a manner not consistent with Section 15.247 could cause severe problems for those spread spectrum systems operating in the band.

V. THE COMMISSION MAY NOT MODIFY RULES ADOPTED IN THIS PROCEEDING AS A RESULT OF RULES ADOPTED IN THE LMS PROCEEDING

14. At paragraph 34 of the *Notice*, there is a reference to the Report and Order in the LMS proceeding, and mention of the fact that there are currently pending petitions for reconsideration of the LMS rules. The *Notice* goes on to state that any changes to the LMS rules in response to the petitions "may result in modifications

to changes for the spread spectrum regulations under Part 15 proposed for the 915 MHz band." Metricom submits that linking these two proceedings in the manner suggested in the *Notice* would violate the Administrative Procedure Act, 5 U.S.C. § 551 *et seq.* (the "APA").

15. The LMS proceeding is separate and distinct from the instant proceeding. The LMS proceeding deals with rules for Part 90, licensed systems. The LMS proceeding does not deal with any Part 15 rule provisions. Similarly, the instant proceeding deals specifically with Part 15 rules, and has nothing whatsoever to do with Part 90 operations. Each proceeding is, therefore, separate and distinct.

16. The APA makes it clear that before any substantive rules are modified or implemented, there must be an opportunity for notice and comment. Accordingly, if spread spectrum rules are adopted in this proceeding, such rules may not be modified unless and until there is an opportunity for notice and comment. The LMS proceeding has not compiled a record related to Part 15 rules. Therefore, there can be no changes to Part 15 rules as a result of the LMS proceeding. If the Commission believes it necessary to change the Part 15 rules adopted herein as a result of final rules adopted in the LMS proceeding, then the Commission must issue a Notice of Proposed Rule Making, explain why the Part 15 rules should be modified, and propose the manner in which the Part 15 rules should be modified. Merely modifying the Part 15 rules as a result of the LMS proceeding, as suggested by the *Notice*, would

clearly violate of the APA and would not withstand judicial scrutiny.

WHEREFORE, the premises considered, Metricom urges the Commission to take action in this proceeding in accordance with the views expressed in the Part 15 Coalition Comments, as supplemented by these Comments.

Respectfully submitted,

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